Oct. 19, 1937. J. W. HARVEY 2,096,037

MARINE MOTOR CONSTRUCTION

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Fig. 1.

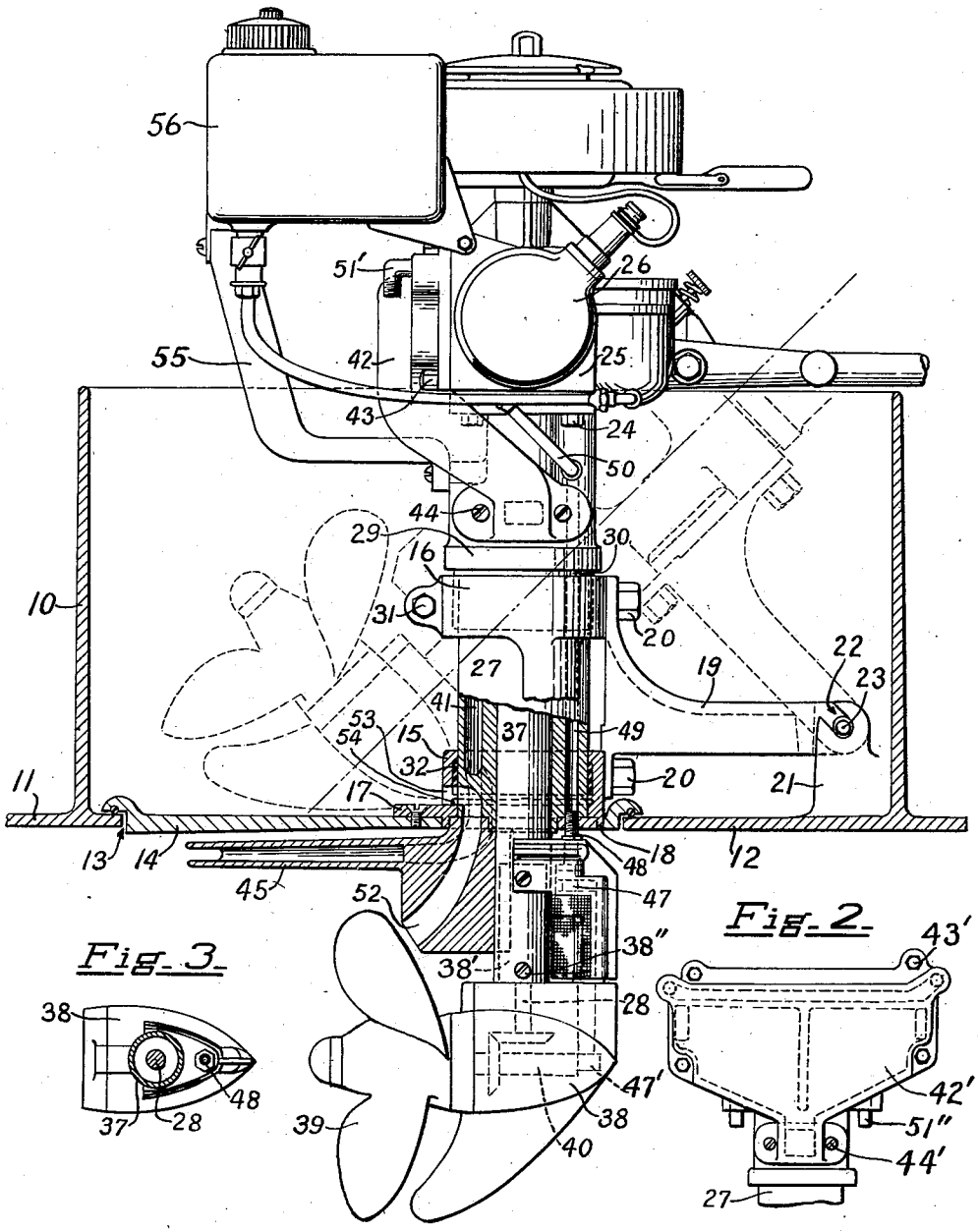


Fig. 3.

Fig. 2.

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Fig. 4.

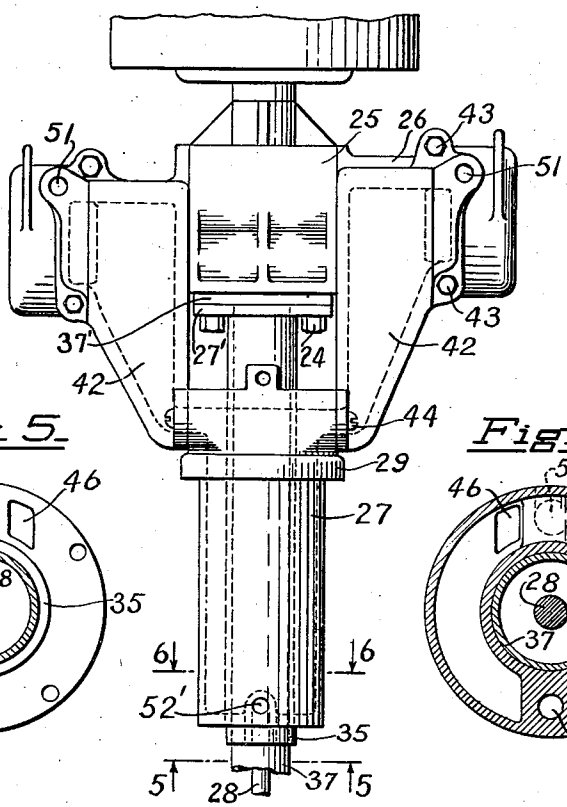


Fig. 5.

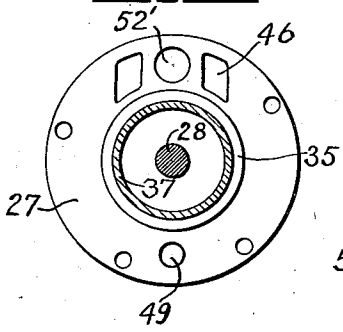
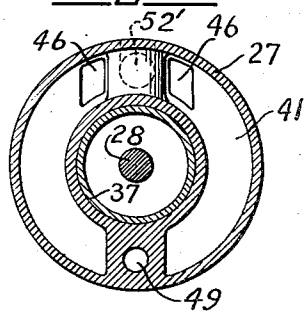


Fig. 6.



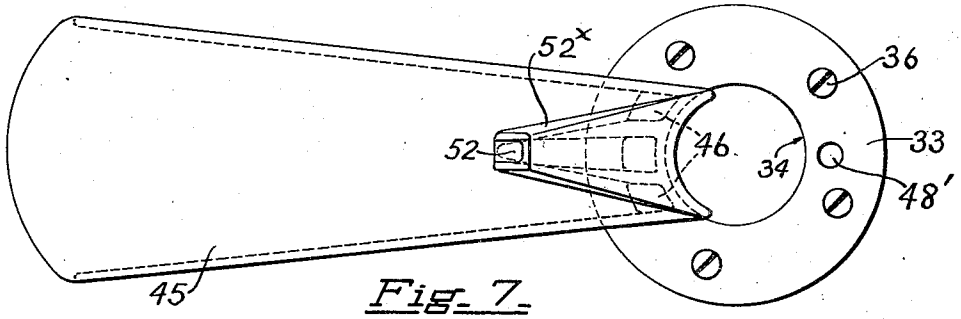


Fig. 7.

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Fig. 8.

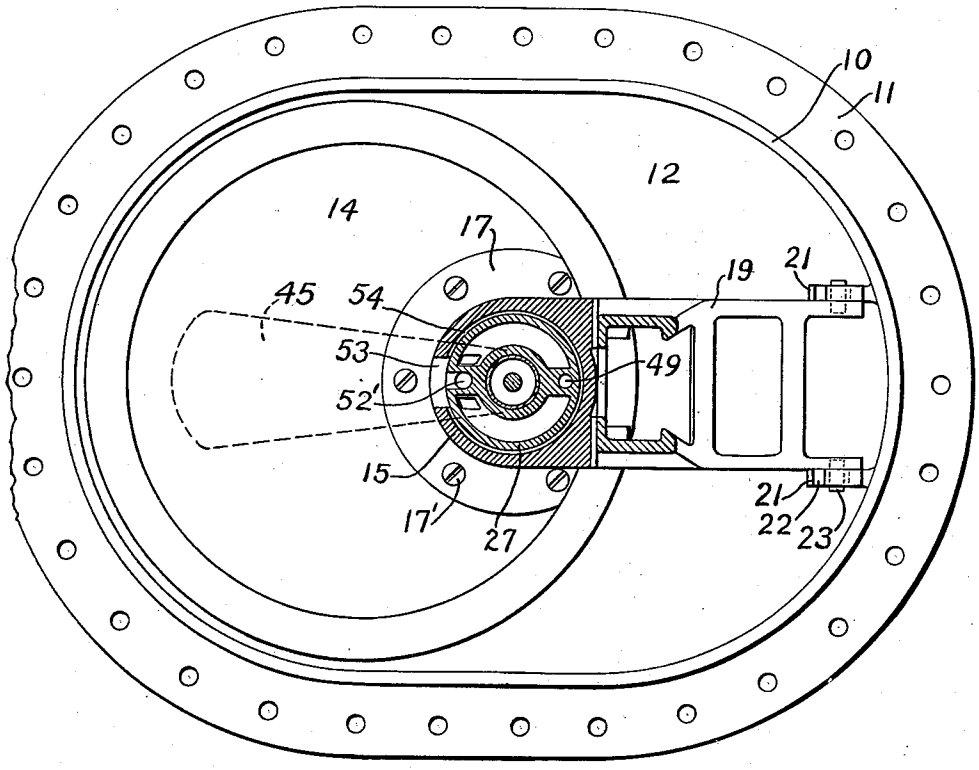
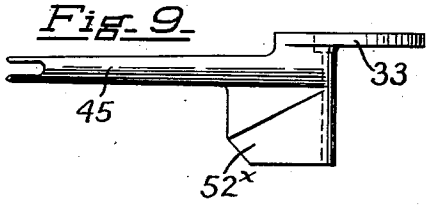


Fig. 9.



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Patented Oct. 19, 1937 2,096,037

UNITED STATES PATENT OFFICE

2,096,037

MARINE MOTOR CONSTRUCTION

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Application June 26, 1933, Serial No. 677,652

17 Claims. (Cl. 115—18)

My invention relates particularly to constructions of the type of my former Patents 1,786,997, 1,824,887, 1,840,948 and 1,874,988, in which a gas engine power unit is removably supported in a casing in the bottom of a boat.

The main object of the present invention is to provide a simple and efficient form of construction of this character which can be readily made according to standard machine practice.

Another object is to provide a construction of this character having a simple but effective cooling system for the motor.

Another object is to provide a construction of this character which exhausts under water without material loss of effectiveness of the motor.

Another object is to provide in such a construction an underwater exhaust which does not change or interfere with the action of the propeller.

Another object is to provide a simple type of hinged joint for the tilting motor unit which holds the parts securely in place in normal operation but which permits the motor to be readily inserted and removed.

Another object is to provide a construction which will automatically drain the casing without decreasing the efficiency of the propeller.

Fig. 1 is a longitudinal sectional view and side elevation showing one form of construction involving my invention, the parts being shown in full lines in the running position and in dotted lines in the tilted or retracted position.

Fig. 2 is a detail rear view of a modified muffler construction.

Fig. 3 is a plan view of the propeller and pump housing with the shaft and support in section.

Fig. 4 is a rear view of the motor housing and the vertical shaft housing with the exhaust chambers.

Fg. 5 is a section on the plane of the line 5—5 of Fig. 4 looking upwardly at the lower end of the vertical shaft and exhaust housing.

Fig. 6 is a horizontal section and plan on the plane of the line 6—6 of Fig. 4 but rotated 180°.

Fig. 7 is a bottom plan view of the exhaust and water drain member.

Fig. 8 is a plan view showing the casing with the vertical housing sectioned on the plane of the water drain passages.

Fig. 9 is a side view of the exhaust and water drain member.

The casing 10 is formed of any suitable material and has a flange 11 which is adapted to be secured to the bottom of the boat. The floor plate 12 of this casing has an opening 13 in which the motor supporting plate 14 is supported when the parts are in the running position.

A motor of any suitable type is normally supported by the plate 14.

A sleeve member preferably of skeleton formation has a bottom ring 15 and a top ring 16 and a bottom flange 17. This sleeve member also has a cylindrical flange 18 which fits in a corresponding opening in the bottom plate 14. The sleeve is secured to the bottom plate, for instance, by a plurality of screws 17'.

A bracket 19 is secured to the sleeve by means of bolts or cap screws 20, 20. The front end of the bracket is pivotally supported in the front end of the casing, for instance, by means of a pair of lugs 21 which may be cast integral with the casing or detachably carried by a wall thereof.

To facilitate insertion and removal of the unit the lugs 21 are provided with inclined slots 22 adapted to receive the hinge pins 23 carried by the bracket.

The motor head 25 includes the usual crank case and cylinders 26 and is supported by the vertical intermediate housing 27 to which it is secured by a number of bolts 24. The vertical drive shaft 28 is connected to the usual crank shaft in any desired manner. The intermediate housing 27 has a laterally projecting flange 29 which is supported on a suitable bushing 30, for instance, of fibre or rubber in the upper sleeve ring 16. This upper sleeve ring is preferably split and provided with a clamp screw 31 by which it may be tightened so as to permit adjustment of the pressure of the ring on the housing 27. A bearing ring or bushing 32 is also preferably provided inside of the lower sleeve ring 15.

The lower housing member includes a ring 33 which fits within the annular flange or collar 18 of the sleeve member. This ring also has an opening 34 which receives the flange 35 which projects downwardly from the intermediate housing member 27. The ring is detachably secured to the intermediate housing member by screws 36.

The tubular member 37 constitutes a housing for the shaft 28 and is provided with a flange 37' which is clamped between the flange 27' of the intermediate housing and the lower face of the crank case 25 by the screws 24.

The lower housing member 38 contains the usual bevel gear transmission and supports the propeller 39 and its shaft 40. This housing member has a tubular extension 38' which extends upwardly into the lower end of the tube 37 and is secured by screws 38''.

In some cases the tubular member 37 may be

omitted and the extension 38' of the propeller housing secured directly in the underwater member 45.

The intermediate housing member 27 is provided with a chamber 41 which constitutes an exhaust manifold or passage connected at its upper end to the usual exhaust outlets of the motor cylinders by castings 42 which are secured in place by cap screws 43 and 44. The lower end of the chamber 41 is connected to the exhaust member 45 through passages 46.

It will thus be seen that the exhaust from the motor cylinders passes through the castings 42 and through the chamber 41, the passages 46 and the exhaust member or nozzle 45. The latter is flattened and flared toward the outlet end which is located above and considerably aft the propeller 39 so that the exhaust gas can not possibly mix into the water affected by the propeller. In this way I prevent the serious interference with the propeller action which takes place when the exhaust gases are allowed to escape into the water in front of or adjacent the propeller. A considerable length of the nozzle 45 being spaced apart from the bottom plate 14, water passes around it and aids in drawing out the gases.

The tapering of the exhaust extension 45 insures a maximum velocity of the exhaust gases as the boat moves through the water.

In the modification shown in Fig. 2 a single casting 42' is substituted for the two castings 42, 42 previously described and the two motor cylinders exhaust into opposite sides of the casting, which thus constitutes a primary expansion chamber and muffler which discharges into the upper end of the intermediate housing member 27. This single casting may be secured to the motor cylinders by screws 43' and to the housing 27 by screws 44'.

In motors of this character it is desirable to provide forced feed cooling water for the cylinders and sometimes for the exhaust manifold. For that purpose I preferably provide some suitable form of pump 47 for picking up water from in front of the propeller and forcing it through the desired cooling channels. This pump may be driven by a cam 47' on the end of the propeller shaft, as shown in Fig. 1. Such a pump will, of course, be provided with the usual valves and for convenience in assembly the pump structure is provided with a projecting nipple 48 which projects into the passage 48' and into the lower end of the water passage 49 in the intermediate housing.

In some constructions a suitable form of rotary pump may be used on the vertical shaft between the vertical housing and the underwater housing.

One or more pipes or conduits 50 are connected to the upper end of the water passage 49 for delivering the cooling water to such parts of the motor as may be desired.

The water is discharged from the outlets 51 into the casing 10. A discharge elbow or pipe 51' may be provided if desired for the discharge outlets.

In the form shown in Fig. 2, the cooling water traverses the cooling water passages and is discharged into the casing through outlet pipes 51''.

The outlet member is provided with an eduction passage 52 located immediately in front of the path of the propeller blades. The ring 15 is provided with a slot 53 and the lower end of the housing 27 is provided with a passage 52' which connects the slot 53 with the upper end of the passage 52. When the propeller is rotating it draws the water out of the casing 10 through the passages 53, 52' and 52. When the propeller is used for steering as well as forward propulsion, it is desirable to have the opening 53 elongated horizontally so that connection with the passage 52' is maintained when the motor housing is rotated on its vertical axis. A groove 54 may also be provided to insure continuity of the discharge passage when the motor housing is rotated so as to reverse the direction of propulsion.

The tapering side walls 52x of the water outlet expedites the water eduction by the propeller.

It will thus be seen that the propeller serves not only to take care of any water which may leak into the casing 10 from the bottom but it also serves to remove the cooling water which is discharged into the casing from the motor cylinders, muffler, etc.

By discharging the cooling water into the casing there is always a supply of water to keep the drain outlet 52' filled or sealed so that but little if any air is drawn through the passage 52 which would interfere with the efficiency of the propeller.

For convenience in carrying the motor a handle 55 may be provided which connects the gas tank 56 with the intermediate housing 27, as shown in Fig. 1.

When the motor is in place, as shown in Fig. 1, it is obvious that it can not be lifted in a straight line vertically because of the upper wall of the inclined slot 22 and its relation to the hinge pin 23. By tilting the motor, however, into the dotted line position the motor may be withdrawn diagonally toward the left, as viewed in Fig. 1. Of course, the motor may be inserted into position in a reverse manner.

The weight of the motor and attached parts serves to hold it in position but in case an obstruction is met the propeller housing swings about the axis of the hinge pins 23 into the dotted position so as to clear the obstruction without damage. Of course, the propeller may be similarly retracted by hand when desired. When driving the boat forwardly the pressure of the propeller against the water transmits force through the hinge pins 23 and through the engagement of the bottom plate 14 in the opening 13 in the floor of the casing. These hinge pins being above the level of the bottom plate, the pressure of the propeller tends to hold the bottom plate 14 on its seat. The weight of the motor, of course, also aids in holding it in its normal running position.

The height of the hinge pins, however, should not be too great or the motor can not tilt readily when the propeller housing strikes an obstruction.

The parts are so arranged that the propeller retracts freely within the casing when the boat is going forwardly. When the propeller housing is reversed to drive the boat to the rear, the exhaust member 45, of course, extends under the floor 12 of the casing and prevents the tilting action.

The construction as shown and described makes it possible to machine the various parts by conventional and practical methods.

I claim:

1. In a motor installation, a floor plate having

an opening, a closure plate fitting the opening and having a passage, a sleeve having a collar fitted in said passage, a vertical housing having an exhaust chamber and rotatably supported in said sleeve and having a projecting collar, an exhaust member secured to the housing and having a portion fitting between said collars, a propeller unit carried by said housing beneath the closure plate, said exhaust member having its inlet connected with said housing chamber and having a discharge outlet considerably in rear of the propeller.

2. A motor unit comprising a bottom plate, a sleeve secured to said plate, a housing supported rotatably in said sleeve and having an exhaust chamber, a tubular member extending through said housing and supported at the upper end thereof, a propeller unit carried by the lower end of said tubular member and an exhaust member secured to the lower end of the housing and having an inlet connected to the exhaust chamber and an outlet discharging above and in rear of the propeller unit.

3. A motor casing unit comprising a removable bottom plate for the casing, a sleeve secured to the upper surface of the plate, a motor and vertical intermediate housing supported and rotatable on said sleeve, said motor having a cooling chamber discharging into said casing, an underwater unit detachably secured to the intermediate housing and rotatable therewith, said underwater unit including a propeller and a pump driven by the motor for picking up water and forcing it to the motor cooling chamber, said underwater unit having an inlet in the casing above the bottom plate and an outlet located adjacent the propeller whereby the cooling water is discharged from the motor into the casing and drained from the casing by the action of the propeller.

4. A motor casing construction comprising a floor plate having an opening, a bottom plate fitted in said opening and having an opening, a sleeve member having a portion fitted in the latter opening, a vertical housing rotatably supported in said sleeve, and an underwater housing secured to said vertical housing and fitted in a portion of the sleeve, said underwater housing and said vertical housing having interfitting vertical walls.

5. In a motor unit, a circular bottom plate having a circular opening near one edge, a sleeve secured to the plate and having a collar fitted in said opening, a vertical exhaust housing mounted in said sleeve and having a chamber, an underwater housing fitted within said collar and secured to said vertical housing with an exhaust outlet connected with the exhaust chamber.

6. In a motor unit, a bottom plate having an opening, a sleeve carried by said plate, a vertical housing rotatably mounted in said sleeve and having an extending flange, an underwater housing extending within said opening and secured to said vertical housing around its flange.

7. In a motor unit, a bottom plate having an opening, a sleeve secured to said plate, a vertical housing mounted in said sleeve and having a water passage, an underwater housing having a flange fitted in the lower end of said housing and secured to the vertical housing, and a cooling water pump having a discharge nipple extending through said flange into said vertical housing passage.

8. A motor unit comprising a casing having an opening in the rear of its floor plate and having lugs in the front end of the casing with inclined bearing slots open at the top and inclining rearwardly, and a power unit having a bottom plate fitting said opening and having a supporting bracket with hinge pins detachably mounted in said slots and a propeller retractable into the casing by tilting on the hinge pins, whereby the power unit can only be demounted by first retracting the propeller into the casing.

9. As an article of manufacture, an underwater exhaust member for a gas engine comprising an annular ring adapted to be secured to the lower end of a vertical shaft housing and a rearwardly extending exhaust outlet extension with an entrance through said annular ring, said extension flaring laterally outwardly toward the rear and tapering to a rear edge which is vertically thinner than at the end near the ring and offset below the plane of the ring.

10. As an article of manufacture, an underwater exhaust member for a gas engine comprising an annular ring adapted to be secured to the lower end of a vertical shaft housing and a rearwardly extending exhaust outlet extension with an entrance through said annular ring, said extension flaring laterally outwardly toward the rear and tapering to a rear edge which is vertically thinner than at the end near the ring and offset below the plane of the ring, and a lower portion having a water outlet in position to coact with the propeller, the side walls of the lower portion inclining toward each other rearwardly to the outlet.

11. A motor unit comprising a vertical shaft and intermediate exhaust housing, a cylinder mounted on the top of the housing, a propeller and underwater housing connected to the lower end of the vertical housing, a muffler secured to the cylinder and connected to the vertical housing and an exhaust outlet connected to the underwater housing and discharging aft of the propeller so as to prevent slip.

12. In a motor unit, a vertical shaft, an intermediate housing on the shaft, a sleeve supporting said housing, a depending flange on said housing, a muffler device below said housing, means of connection between the housing and muffler including a ring surrounding the depending flange and a depending flange on said sleeve surrounding said ring.

13. As an article of manufacture, an underwater discharge member for a gas engine having a ring for attachment to an exhaust housing, an exhaust eduction member projecting rearwardly from the ring and a tapered water outlet extending beneath the exhaust eduction member.

14. As an article of manufacture, a plate having means for attachment to an exhaust housing, a flat exhaust extension beneath and in rear of said plate, and a water outlet tapered rearwardly from said plate and beneath the exhaust member and discharging in front of the discharge end of the exhaust member.

15. A motor unit comprising a cylinder casting, a tubular shaft housing secured to said casting, an exhaust housing surrounding said shaft housing and removable therefrom, a manifold connecting said casting with said exhaust housing, a propeller housing secured to said shaft housing and removable therefrom, a pump in the propeller shaft housing delivering water through the wall of the exhaust housing and an underwater discharge member secured to the lower end of the exhaust housing and removable therefrom.

16. A motor having a main shaft with an inter-

nal combustion power unit connected to the upper end and a propeller on a horizontal shaft geared to the lower end of the main shaft, a vertical main housing surrounding the main shaft and supporting the power unit and having an exhaust chamber connected to the exhaust outlet of the power unit, an outlet member secured to the lower end of the main housing and having an eduction discharge for water immediately in front of the upper edge of the propeller, a bottom plate carried by the lower end of the said outlet member having a flat projection extending horizontally straight to the rear and immediately and entirely above the level of the propeller and spaced apart from the bottom plate with a gas exhaust passage connected with the exhaust chamber in the main housing and discharging the products of combustion from the motor well in rear of and above the level of the upper edge of the propeller and below the bottom plate without disturbing the slip stream from the propeller.

17. A gas engine comprising, a crank case having oppositely disposed cylinders, a vertical housing secured to said case and having a main exhaust chamber, independent castings each having an exhaust expansion chamber connecting a cylinder with the upper part of the main exhaust chamber and on opposite sides thereof, a vertical crank shaft for the engine mounted within the vertical housing, a propeller geared to the lower end of said shaft, a bottom plate connected to the lower end of the vertical housing and an underwater exhaust connected to the lower end of the main exhaust chamber and discharging entirely above and in rear of the slip stream of the propeller and below the bottom plate.

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